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NORTHEASTERN FOREST EXPERIMENT STATION SURVEYS ITS FIRST TEN YEARS

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July 1, 1933 marks the tenth birthday of the Northeastern Forest Experiment Station, for on that day ten years ago funds became available for the establishment of a regional station to serve all of New England and New York. During its first ten years the station has established itself in the region as an agency for leadership and coordination in the advancement of technical forestry practices and has made notable contributions to the knowledge of forest management. But with so large a proportion of the land area of the region suitable primarily for forest uses and with a growing appreciation of the importance of proper land use to economic and social welfare, unlimited opportunities for service lie ahead.

Physical Development

The creation of the Station in 1923 was the result of a movement which had been under way in the region for several years, sponsored in Congress primarily by Senator Lodge of Massachusetts, Senator Keyes of New Hampshire, and Representative Snell of New York. The initial appropriation was about \$23,000 and the staff consisted of four technical men and a clerk. In its tenth year the Forest Service appropriation for the station was \$47,200, and additional amounts totaling about \$16,000 were expended by other bureaus for work there. There are now 12 technical men on the staff, including representatives of the Bureaus of Plant Industry, Entomology, and Biological Survey, and in addition there are 5 clerks and computers. During the decade there have been three directors: S. T. Dana, 1923-1928; J. S. Boyce, 1928-1929; and C. E. Behre, 1929 -.

Originally occupying offices at the Massachusetts Agricultural College at Amherst, Mass., the station moved its headquarters during the summer of 1932 to New Haven, Connecticut, where space provided by Yale University will allow for considerable expansion in the future.

Since much necessary information on growth, reproduction, and management of forests can only be obtained by intensive observations on specific areas over a long period of time, a large share of the work of the

Northeastern Station has consisted in the establishment, treatment, and subsequent remeasurement of permanent sample plots. Starting with a small number of such plots which had been established by the Forest Service in 1905 and 1906, the number of areas on which long time records are being obtained has now reached 545, involving altogether about 437 acres. These plots vary in size from 0.1 acre to 28 acres each, depending on the purpose for which established. Plots over 1.0 acre in size are relatively few in number and are restricted to studies of methods of cutting, slash disposal, or girdling.

Early in the development of the station it was recognized that such long time experiments should be concentrated in so far as practicable on a few representative areas in order to facilitate the administration of the work, to permit of closer coordination of results, and to increase the educational value of the experiments. Two experimental forests, together comprising about 4,000 acres, have been set aside for this purpose in the White Mountain National Forest, N. H., and tentative agreements have been reached for the cooperative use of two additional areas of between 500 and 600 acres each in New York State. In addition a number of other areas have come to be used as centers of work by the establishment of numerous permanent plots in the locality.

On the Gale River and Bartlett Experimental Forests in the White Mountain National Forest detailed and continuous meteorological records are being obtained in order to interpret more intelligently the local environment and the silvicultural reactions of the forests. In order to permit experimental cuttings on a small scale anywhere in these forests, several miles of woods roads have been constructed, this necessary work having been a part of the federal program of unemployment relief. Supplementing the special study plots already mentioned, detailed records have been obtained on over 1,000 quarter-acre plots, established in connection with an inventory of these two experimental forests, and permanently marked for future observation.

It will be seen from the foregoing that a broad foundation has been established for advancing scientific knowledge of the forests of the region and that a large volume of experimental data is being obtained which has only just begun to yield tangible results.

Advisory Council

In the formulation of its program the station has had the advice and help of the Northeastern Forest Research Council which was organized by the Secretary of Agriculture shortly after the establishment of the experiment station. This council is composed of representative forest land owners, business men, educators, state forestry officials, and others interested in the development of the forest resources of the region. It has served not only to advise the federal experiment station, but to stimulate and coordinate research by all forestry agencies in the region.

Accomplishment in Principal Lines of Study

Because the spruce-hardwood forests of the northern portion of the region are of major industrial significance and because very little investigative work had been done in these forests as compared to the southern portion of the region, the work of the Northeastern Station has been concentrated to a large extent in the northern forests. Without attempting to list all its projects or accomplishments or to arrange them in order of importance, the following paragraphs outline the principal lines of work in which the station has been engaged.

1. Growth and Yield of Spruce and Fir.

Part of the initial effort of the station was devoted to the preparation of normal yield tables for even-aged stands of spruce and fir. The tables completed by W. H. Meyer in 1926 have become the standard for the region. Major attention is now being given to studies of growth on cut-over lands. This work has contributed materially to the knowledge needed for satisfactory estimates of regional growth.

2. Management of Spruce and Fir for Pulpwood. This project, which has been developing under the direction of M. Westveld since the establishment of the station, covers a broad field, involving studies of natural reproduction, cutting methods, slash disposal, and cultural measures. This work has shown the importance of the advance reproduction, especially of seedlings between 2 and 5 feet in height. Practical suggestions for protecting this reproduction from damage as a result of logging have been made. Closely related to this has been the development of a practical policy for the disposal of logging slash which meets both silvicultural and fire protection requirements at

much less cost than former practices of the U. S. Forest Service. These studies have also established the significance of certain forest types or associations in relation to the details of desirable silvicultural treatment, and attention has been focused on the substantial increases in pulpwood yields which may be obtained from cultural treatments, such as girdling of cull hardwoods.

3. Decay of Slash. Studies of the importance of the various fungi involved in the decay of the debris left after logging and of their relation to environmental conditions have been receiving the attention of Doctor Perley Spaulding of the Bureau of Plant Industry, since 1925. His conclusion that no expenditure of money is justified for the treatment of hardwood slash has meant substantial savings to the U. S. Forest Service.

4. Deterioration of Birch on Cut-over Land. The deterioration of hardwoods left for future growth after selective cutting operations, especially serious in respect to yellow and paper birch, has been definitely associated with the inability of the trees to make adjustment to radical changes in environmental conditions. This important conclusion, which should influence silvicultural practices thruout the northern hardwood region, was reached only after intensive study by representatives of the Bureau of Entomology and Plant Pathology had eliminated parasitic insects and fungi as possible primary agents in the deterioration. More detailed study is now being given to the silvical aspects of the problem.

5. Development of Universal Volume and Taper Tables. Technical studies of the stem form of trees which are of significance in the measurement of standing timber have been conducted by C. E. Behre, who laid the foundation for this project by previous work at the University of Idaho. A number of articles have appeared in the technical periodicals and the work has attracted considerable attention abroad, especially in Sweden.

6. Analysis of Fire Statistics. Early in its life the station was instrumental in the adoption of a standard form for reporting forest fires by all the Northeastern states. Financial assistance was then obtained from the states of Connecticut, Vermont, New Hampshire, and Maine, for a comprehensive analysis of the records of forest fires for a number of years in

each state. The compilation was done under the direction of S. T. Dana, and the reports have been helpful in strengthening the protection activities of the states concerned.

7. Forest Fire Hazard. This project has involved (a) the study of the prediction of forest fire-weather by the Weather Bureau, which has undertaken to issue forecasts of the occurrence of danger periods thruout the season, and (b) the study of the relation between weather and inflammability of the forest fuels, in which the station has had cooperation from a number of agencies in the region. Charts developed by P. W. Stickel after obtaining records of meteorological conditions and of moisture content of forest fuels in four localities for a five-year period enable the men in the protective organizations to follow closely the day to day changes in local inflammability and so coordinate their activities with the daily fire-weather forecasts.

8. Control of Spruce Budworm. Extensive studies of factors relating to the spread of the spruce budworm and of the character of the damage done by this insect have been carried on by H. B. Peirson from a cooperative fund contributed for that purpose by a number of Maine timberland owners. Epidemics of the spruce budworm were found to have their origin in pure stands of balsam fir. This finding greatly simplifies efforts at control of this insect, and should influence forest management practices thruout the spruce region.

9. Control of the White Pine Weevil. Studies by Doctor MacAloney of the Bureau of Entomology, in cooperation with the Harvard Forest, have emphasized the importance of growing white pine in mixture with other species as the best way to minimize damage from the white pine weevil, and have led to the introduction of a special technique for salvaging badly weeviled stands. Considerable uncertainty concerning the relation of birds and mammals to the white pine weevil has also been cleared up by recent study of this aspect of the problem by J. P. Miller of the Biological Survey.

10. Control of other Forest Insects and Diseases. The growing menace of the European pine shoot moth was called to the attention of foresters and entomologists by the station thru its advisory council in 1924, and the council is still active in attempting to stimulate and coordinate the campaign against this insect.

An outbreak of the European larch canker in New England, a disease which offered a potential threat to the extensive Douglas fir forests of the west, was scouted, studied, and completely eliminated under the leadership of the station pathologist. Reports on detailed studies of the white pine and pitch pine blister rusts begun prior to the establishment of the station have been published and considerable attention has also been devoted to a rust on Scotch pine, discovered near Woodgate, New York.

11. Relation of Light and Soil Moisture to Tree Growth. A new type of thermoelectric radiometer for measuring accurately the light in the forest was developed by Doctor P. R. Gast while working on this project in cooperation with the Harvard Forest.

12. Growth and Yield of Northern Hardwoods. This project was initiated in 1931 and is now under the leadership of L. H. Reineke. New volume tables have been prepared for the immediate use of the White Mountain National Forest, and a considerable demand for these tables has come in from other agencies in the region. Mr. Reineke has devised an ingenious instrument to facilitate the measurement of hardwood increment cores. The Bartlett Experimental Forest, in charge of Victor S. Jensen, will contribute much to this project.

13. Forest Planting. This is another new project which has only been in progress since the summer of 1931. The work is in charge of Doctor G. R. Stewart and H. F. Morey. A program of experimental plantings and special studies is being developed as a result of a comprehensive survey of existing plantations and of planting methods in use in the region.

14. Phenology. Thru the cooperation of a number of observers thruout the region the station is compiling extensive and detailed data on the seasonal march of the vegetative activities of forest trees and shrubs in various localities. These observations should be of cumulative value and should lead to a better understanding of many ecological problems relating to the management and protection of the forests.

15. Miscellaneous Activities. The station has compiled and revised after an interval of five years a summary of all forest investigations under way in its region, which has been of great value to workers at the various institutions. It has also made available to the profession full translations of a number of

important contributions from European literature dealing with forest soils and tree mycorrhiza. Members of the station staff have taken active participation in the preparation of manuals of forest measurements and of standard procedure in the establishment of permanent sample plots.

Other activities which have contributed during the past two years in an important though indirect way to a sound national forest policy have been the compilation of data on timber resources of the Northeastern region for the Forest Service report to the Timber Conservation Board, and on the status of forestry in the region for the Forest Service report on the Copeland Resolution. The report on the Copeland Resolution, using the data compiled for the Timber Conservation Board as a background, restates the basic forestry problems which the country faces, and sets up a plan of action which should lead to the next great step in forestry and effective land use.

Publications

A list of the publications of the staff of the Northeastern Forest Experiment Station during the past ten years would include 11 publications by the U. S. Department of Agriculture, 11 bulletins published by other institutions, 4 major papers in the Journal of Agricultural Research, 33 articles in the Journal of Forestry, and about 26 in other periodicals. Altogether these 85 titles comprise about 1,300 pages of printed material. In addition, several manuscripts are now awaiting publication and a number of important translations, mimeographed papers, technical notes, and popular articles have been prepared.

Outlook for the Future

Although the Station's activities have covered a variety of subjects there is need for a still more comprehensive program. It is perhaps most urgent at this time that provision be made for a systematic survey of the forest resources of the region and for studies in the field of the economics of forestry. Basic knowledge is also needed on how various types of growth and methods of forest management influence the quantity and quality of water supplies or the character and abundance of game and wild life in the forest. It is apparent that because of the long-time element in forestry and the diversity of the problems demanding attention, it will be difficult to keep advance of knowledge ahead of the actual need for results.

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